



ATEC VV&A Program

Joint VV&A Meeting
14-15 Nov 01

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Agenda

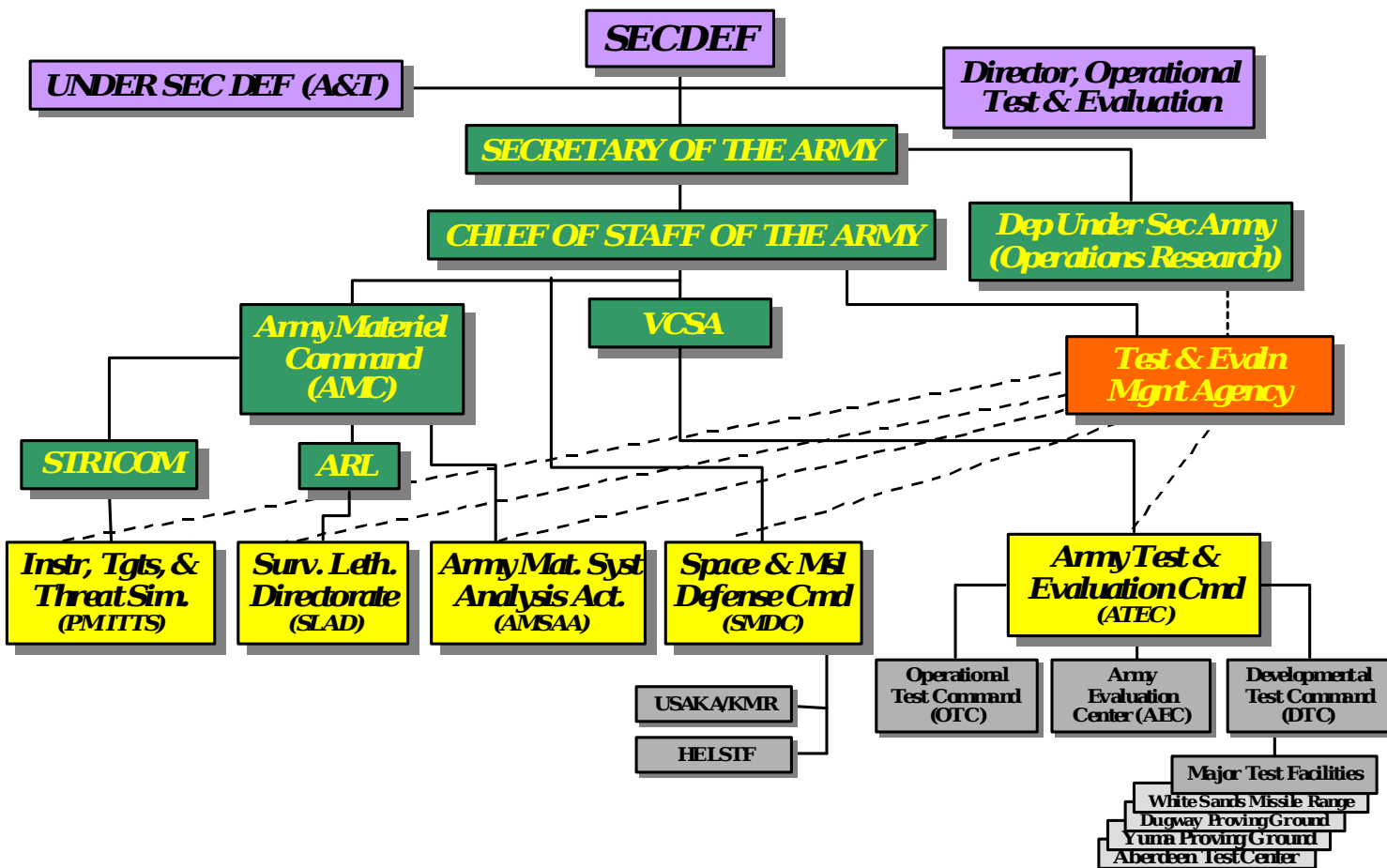


- **Who is ATEC?**
- **Background**
- **VV&A Definitions**
- **T&E Perspectives**
- **Observations and Lessons Learned**
- **VV&A Methodology and Guidance**
- **Conclusions**

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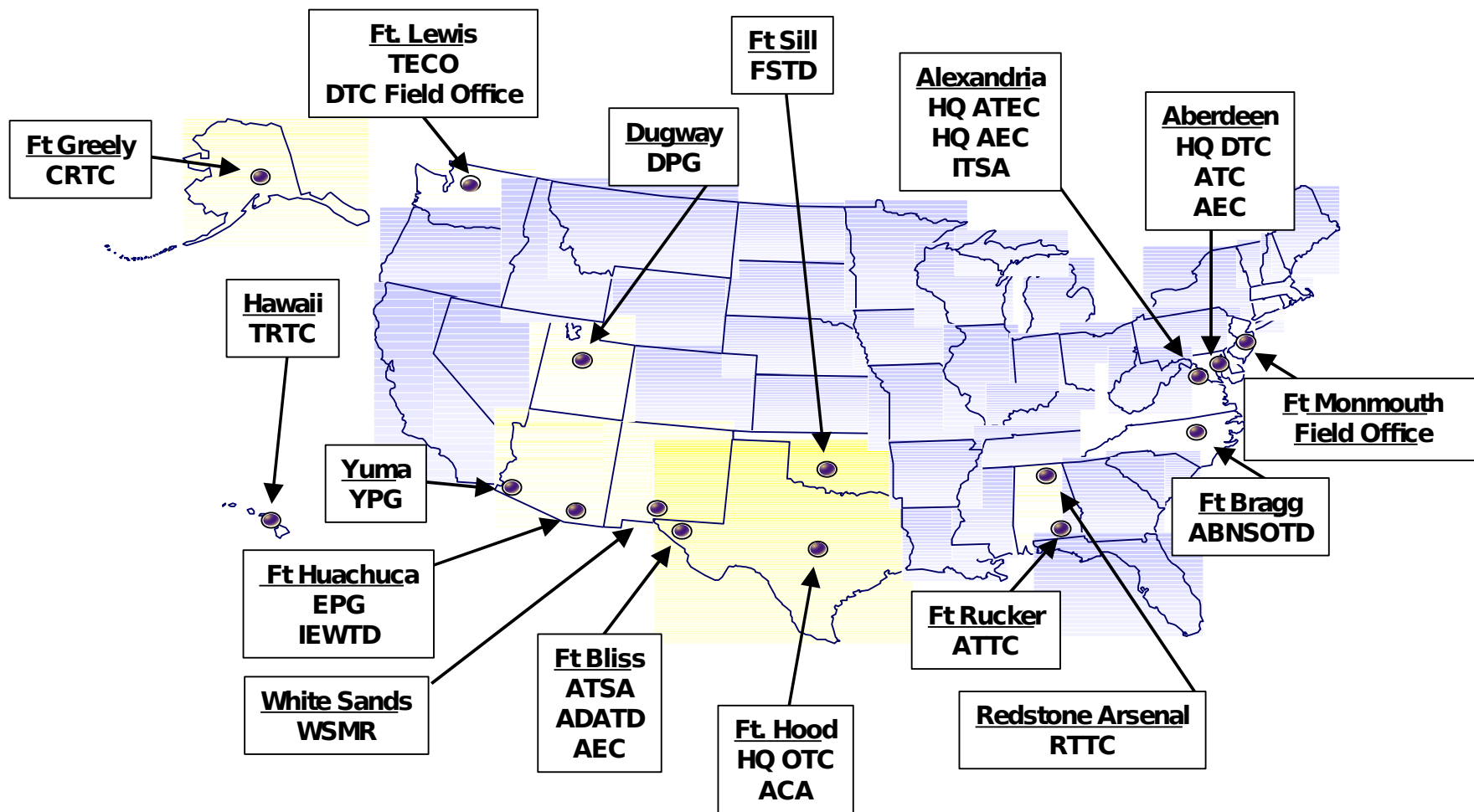
Army Test and Evaluation Community



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ATEC Locations



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Background



- **Jun 95 Chartered TECOM VV&A Work Group**
 - **May 98 Published TECOM Pam 73-4, "VV&A Methodology"**
 - **Oct 99 U.S. Army T&E Consolidation**
 - **Sep 00 Established ATEC VV&A Work Group**
-
- **Mar 01 Charter Approved**
 - **Dec 01 Publish ATEC Methodology version 1**
 - **Jun 02 Finalize ATEC Methodology version 2**
 - **Oct 02 Approve ATEC Methodology**

↑ Past
↓ Future

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Verification



- The process of determining that a M&S implementation accurately represents the developer's conceptual description and specification.**
- Verification also evaluates the extent to which the model and simulation has been developed using sound and established software engineering techniques.**

AR 5-11, DA Pam 5-11, & DMSO

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Validation



- The process of determining the degree to which a Model and Simulation is an accurate representation of the real-world from the perspective of the intended uses of the Model and Simulation.
- **Methods:**
 - comparison with test data
 - expert consensus
 - comparison with historical results
 - peer review
 - independent review

AR 5-11, DA Pam 5-11, & DMSO

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Accreditation



- The official determination that a model or simulation is acceptable for use for a specific purpose.

AR 5-11 & DA Pam 5-11

- The official certification that a model, simulation, or federation of M&S and its associated data are acceptable for use for a specific purpose.

Defense Modeling & Simulation

Office

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T&E Accreditation



**Any M&S Used to Support or
Supplement Testing and Evaluation
Must Be Accredited if the Results
Directly or Indirectly
Influence the Evaluation**



T&E Accreditation (Con't)

Two Levels of Accreditation:

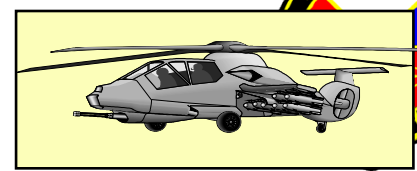
**Class of Applications - V&V focus on
algorithms**

**Application Specific - V&V Focus on
Inputs and Outputs**

**Both levels are needed to accredit M&S for any use in test and/or
evaluation.**



Similar Processes



T&E

Evaluation Plan

Test Plan

Test

Test Report

valuation Report

Requirement

Know the
Intended Uses

Identify
Issues & Criteria
Determine Data
Needs and Sources

Collect Data

Compare Data
With Criteria

Decision

V&V

Accreditation Plan

V&V Plan

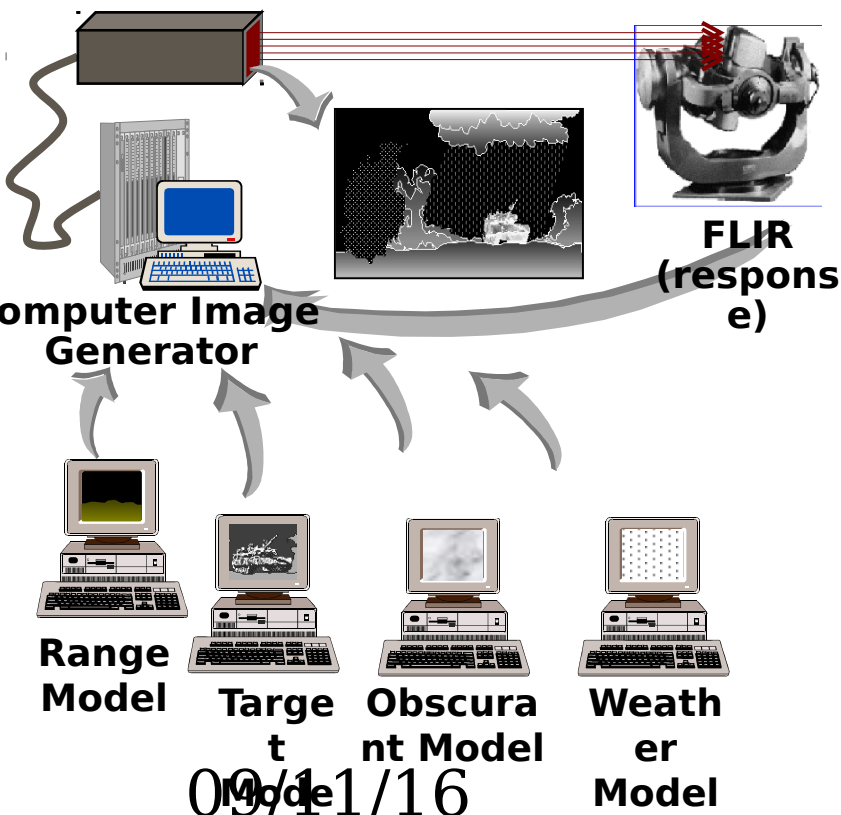
Test

V&V Report

Accreditation Report



Dynamic Infrared Scene Projector (DIRSP)



Input:

- Terrain Data
- Met Data
- Target Signature
- Target Motion
- Obscurant Data
- System Response

Output:

- Dynamic IR Image

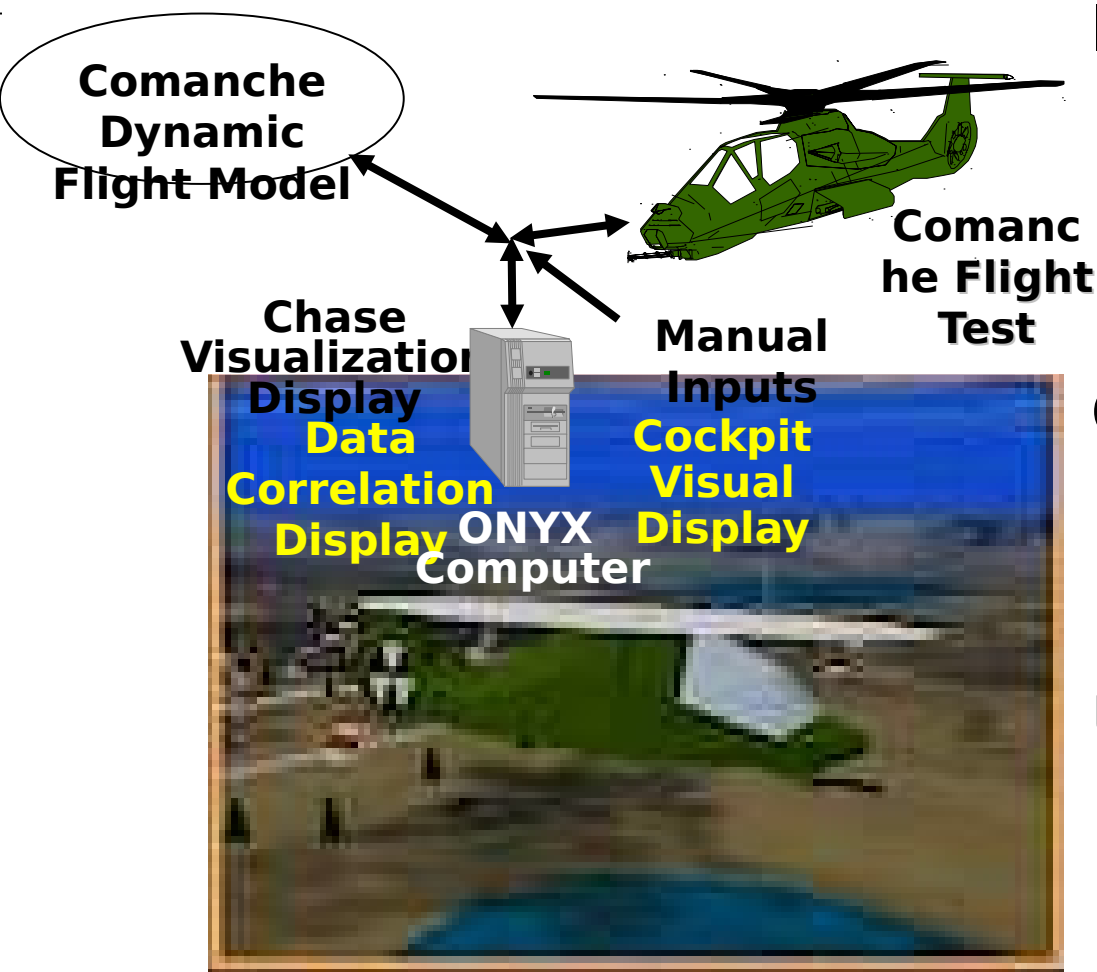
Uses:

- Synthetic Test Environment
- Training

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Flight Test Simulation Station (FTSS)



Input:

- Aircraft Data
- Met Data
- Manual Control
- Flight Test Data

Output:

- Fly-Out
- Sensor Performance
- Target Effects

Uses:

- Test Planning
- Prediction

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DIRSP & FTSS Observations



- **Built/used for system development & DT**
- **Evaluator is asked to accept model output**
- **Evaluator (accreditor) needs to:**
 - **Understand model capabilities and intended use**
 - **Relate to MOPs and MOEs**
 - **Develop acceptability criteria**
- **No incentive to legacy validation**
- **Insufficient documentation of legacy M&S**
- **Lack in-house SMEs**

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Lessons Learned



- **Specify roles and responsibilities.**
- **Must have well-defined intended use and acceptability criteria upfront.**
- **V&V tasks must be agreed upon by all parties before implementation.**
- **V&V is labor-intensive and requires stable & experienced implementation team.**
- **Need to establish a close working relationship between developer and user.**
- **Developer needs to maintain good documentation on system changes.**
- **Be flexible - avoid traditional acquisition approach of fixed specification to prevent acquiring obsolete technology.**
- **Independent peer review can be very helpful, especially at the onset for conceptual verification.**



ATEC VV&A Working Group Members



- **AMSO**
- **ATEC**
- **AEC**
- **OTC**
- **TECO-FL**
- **ATC**
- **ATTC**
- **DPG**
- **EPG**
- **RTTC**
- **WSMR**
- **YPG**
- **DTC**

Debra Ridgeway

Sarah Wilson/John Haug

Scott Lucero *

Jim Hamill *

Scott Solon

Alice Jones

Jerry Higman, Ph.D.

Al Astling, Ph.D.

Dilip Kedia

Tim Clardy

Jesse Nunez

Cindy Sullivan

Jennifer Chew *

*** Rotating Chairs**

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Methodology Basis

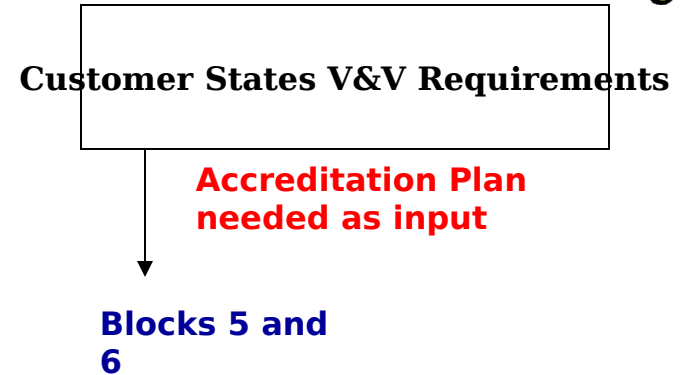
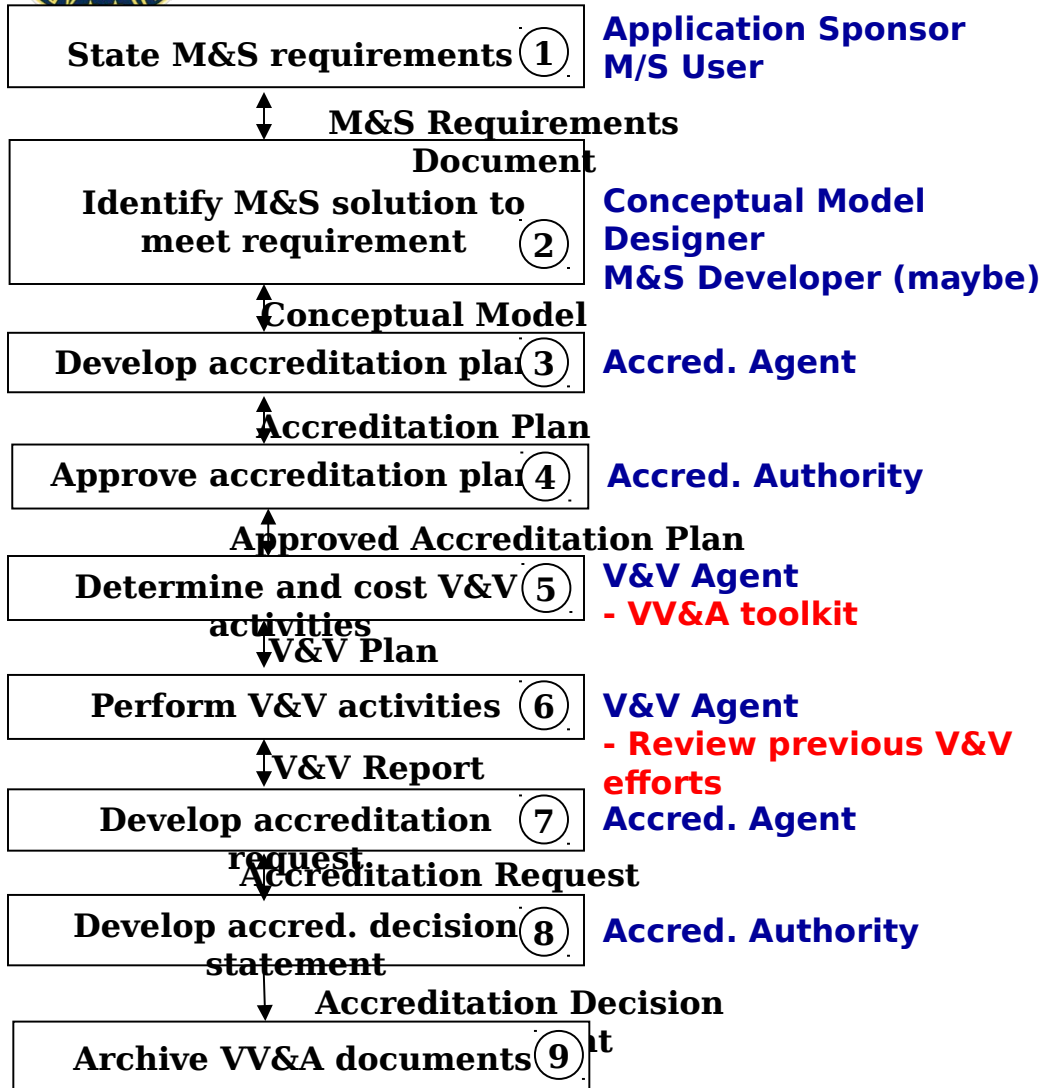


- **ATEC M&S Handbook**
- **OTC TOP and Methodology, 5-291**
- **DTC Pamphlet 73-4, VV&A Methodology**
- **AR 5-11 & DA Pamphlet 5-11**
- **DoD Directives 5000.59, 5000.61, & Recommended Practices Guide**
- **VV&A ITOP Program**

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VV&A Methodology



- Assume that M&S needed to address T&E
- Add example for new use, e.g., new threat data

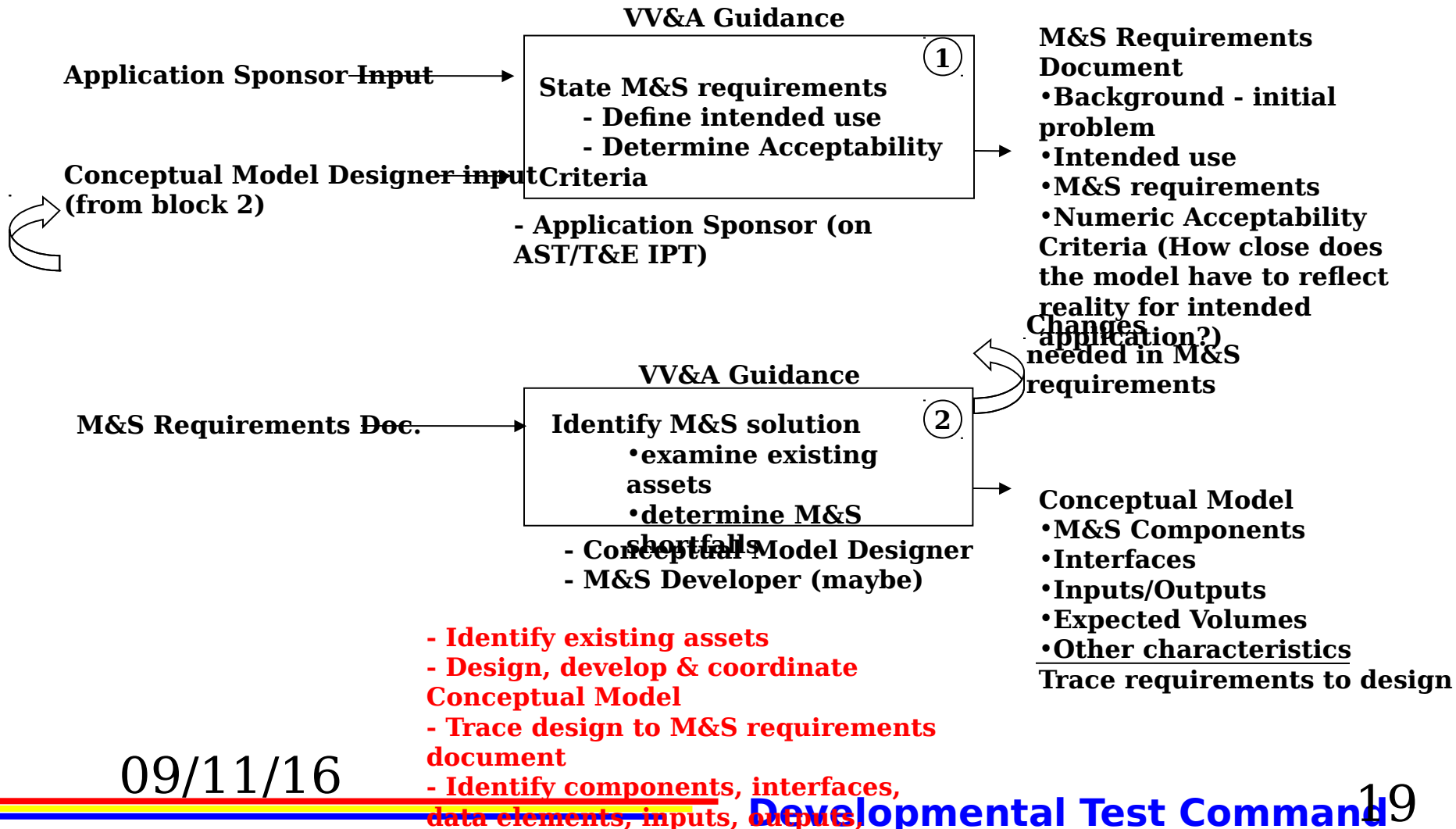
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VV&A Methodology (Con't)



Assume M&S needed for T&E effort
Assume risk analysis has been completed



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VV&A Methodology (Con't)



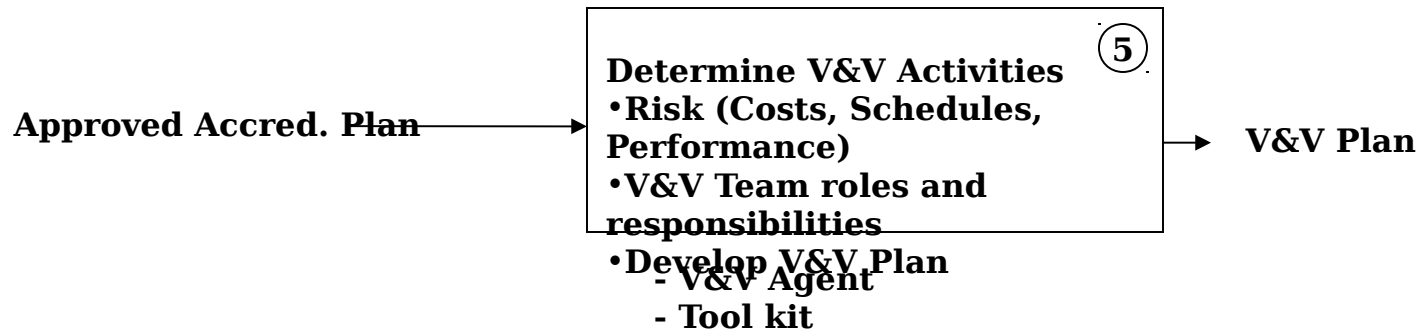
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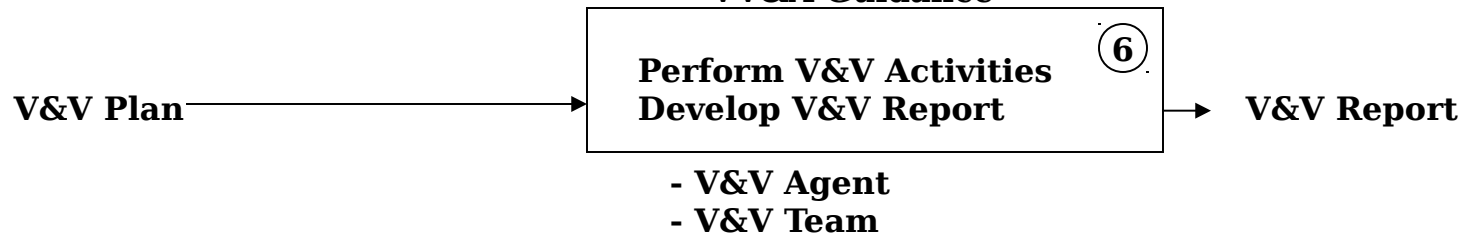
VV&A Methodology (Con't)



- VV&A Guidance



- VV&A Guidance





VV&A Methodology (Con't)



- VV&A Guidance

V&V Report

Develop Accreditation Request

⑦

- Accred. Agent

Accred. Request

- Purpose (Intended use)
- Background
- Acceptability Criteria & results
- V&V Summary
 - Strengths
 - Limitations (Identify resources needed to overcome limitations)
- Supporting Evidence
- Configuration Management
- Issues
- Risk Analysis
- Participating agencies
- Conclusions & Recommendations
- Signatures
- Enclosures

- VV&A Guidance

Accred. Request

Develop Accreditation Statement

⑧

• Final update to Accred. Template
- Accred. Authority

Accreditation Statement

- Decision
- Discussion
 - Acceptability Criteria
 - Limitations
- Additional Guidance

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Conclusions



- Capturing lessons learned to revise methodology.
- Striving for an accepted methodology to ensure that all M&S elements are developed & maintained as a fully accredited system.
- Identifying assets needed for successful VV&A program.
- Developing one Command-wide VV&A guidance.
- Seeking for your participation.

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Developmental Test Command